IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	)	
	)	Atty. Docket No.: **ASAMU0005**
Jinko KIMURA et al.	)	
	)	Group Art Unit: 1752
Serial No. 09/508,771	)	
	)	Examiner: C. Hamilton
Filed: March 16, 2000	)	
	)	
For: PHOTOSENSITIVE FILM	)	

DECLARATION UNDER 37 C.F.R. § 1.132

Assistant Commissioner for Patents
Washington, D. C. 20231

1. I, Chikara ISHIKAWA, state that I am an over 21 years old and competent to make this declaration. A copy of my curriculum vitae is attached hereto.

2. I am familiar with the above-captioned patent application, the invention claimed therein, and the prior art references cited against the claims of the application in the office action dated April 16, 2002. Specifically, I am familiar with the Fifield et al. reference (German Document DE 3825782 A1).

3. The foregoing experimental results were collected by me, or by others under my direct supervision, and the experiments contained herein were performed under my direction or with my understanding and knowledge.

4. **Experimental Conditions**

a. The purpose of the first experiment is to establish the relation between film thickness of the photosensitive resin layer and the generation rate of air voids. The first experiment corresponds to the "Test Report" previously filed relating to the above-captioned application on June 20, 2001.

b. The purpose of the second experiment is to compare the size and number of fish eyes present in the protecting film of a comparative example closest to the protecting film disclosed by the Fifield et al. reference ("prior art protecting film") and a protecting film usable in the present invention ("present protecting film").

5. **First Experiment ("Test Report")**

A resolution for forming a photosensitive resin layer was prepared by using Formulation 1 disclosed in Table 1 on page 16 of the specification of the above-identified application.

The solution thus obtained was uniformly coated on a polyethylene terephthalate film having a thickness of 16 μm and dried for 5 minutes in a hot air circulation type oven kept at 100° C. The thickness of the photosensitive resin layer was varied in 5 μm, 10 μm, 20 μm, 30 μm and 40 μm. Then, the following protecting film was laminated thereon to obtain photosensitive films:

NF-13 (polyethylene film mfd. by Tamapoly Co.)
film thickness: 25 μm
number of fish eyes having a diameter of 80 μm or more per m^2 : ca. 1,000

Each photosensitive film was laminated on a substrate while removing the protecting film at a roll temperature of 110° C, under a pressure of 4 kg·f/cm^2, at a speed of 2 m/min. The

laminated substrate thus obtained was exposed to light by means of a 3 kW Super-High Pressure Mercury Lamp (HMW-201GX, mfd. by ORC Seisakusho, Ltd.) at 50 mJ/cm².

After the exposure, the number of air voids generated on the substrate in the portions of 10 fish eyes having a diameter of 100 μm and the height from the film surface of 6 μm was measured using a microscope with a multiplication of 100.

The relation between the film thickness of the photosensitive resin layer and the generation rate of air voids is shown in the following Table 1:

TABLE 1

Thickness of photo-sensitive resin layer	5 μm	10 μm	20 μm	30 μm	40 μm
Generation rate of air voids (%)	100	100	80	20	0

As shown in the above Table 1, when the film thickness of the photosensitive resin layer is 5 to 30 μm, air voids are generated. Particularly, when the film thickness of the photosensitive resin layer is 5 to 20 μm, the generation rate of air voids is as large as 80 to 100%. On the other hand, when the film thickness of the photosensitive resin layer is as thick as 40 μm, no air void was generated, even if the protecting film has fish eyes of about 1000 per m².

The clear conclusion is that the generation of air voids is dependent upon the thickness of the photosensitive resin layer. This dependence on the thickness of the photosensitive layer is non-linear. As shown by the data, there is no dependence upon the thickness of the photosensitive layer until a critical minimum thickness of 40 μm is reached, then the generation of air voids rapidly increases as the thickness decreases until there is 100% air void generation rate at a thickness of 10 μm. The problem solved by the present invention is precisely this appearance of fish eyes as voids when the photosensitive film thickness is below the critical

range of 30 μm. This problem was not recognized by the prior art, including the Fifield reference.

Thus, it is totally unexpected that one could achieve the extremely low number of "5 fish eyes/m^2 when measured under a microscope at a multiplication of 100" when the photosensitivity layer (B) has a thickness of 5 to 30 μm as claimed.

6. **Second Experiment**

A resolution for forming a photosensitive resin layer was prepared by using Formulation 1 disclosed in Table 1 on page 16 of the specification of the above-identified application.

The solution thus obtained was uniformly coated on a polyethylene terephthalate film having a thickness of 16 μm and dried for 5 minutes in a hot air circulation type oven kept at 100° C. Then, either the protecting film NF-13 (prior art protecting film) of comparative Example 1 or the protecting film E-200C (present protecting film) of Example 1 was laminated thereon to obtain photosensitive films respectively. Protecting film NF-13 corresponds to the prior art protecting film disclosed by the Fifield et al. reference because both films are low-density polyethylene films. After dryness, thickness of the photosensitive resin layer was 15 μm. The size and number of fish eyes on each protecting film of the prior art and of the present invention were measured under a microscope at a multiplication of 100.

The size (practical diameters) and number of fish eyes in the prior art protecting film and in the present protecting film are shown in the following Table 2:

TABLE 2

Example No.	Protecting Film	Diameter of fish eye	
		100 ± 10 μm	200 ± 10 μm
Comparative Example 1	NF-13	Ca. 900/m^2	Ca. 100/m^2
Example 4	E-200C	0/m^2	0/m^2

It is noted that Table 2 above compares to Table 2 on page 19 of the present specification wherein the number of fish eyes for NF-13 of Comparative Example 1 is ca. 1000/m^2 when the diameter is ≥80 μm.

The data clearly shows that a low-density polyethylene protecting film such as NF-13, which corresponds to the protecting film disclosed by the Fifield et al. reference, would have fish eyes of a larger diameter and in greater quantities than protecting films used in accordance with the present invention.

The clear conclusion is that the generation of air voids is also dependent upon selecting a protecting layer with suitable properties. While a low-density polyethylene protecting film, such as NF-13, is not suitable for use in accordance with the present invention, a polypropylene protecting film such as E-200C is suitable.

7. **Discussion of the Results**

Independent claims 1, 19 and 36 in accordance with the present invention recite that the protecting film has fish eyes of a diameter of at least 80μm in a number not exceeding 5 per square meter when measured under a microscope at a multiplication of 100. The results of the

Second Experiment show that a polyethylene film, such as taught by the Fifield et al. reference, cannot meet this limitation. In addition, claims 11 and 36 recite that the photosensitive resin composition-containing photosensitive resin layer (B) has a film thickness of 5 to 30 μm. The results of the First Experiment show that this range of film thickness would increase the air void generation rate when polyethylene protecting films are used, and that the result according to the present invention of fish eyes "not exceeding 5 fish eyes/m^2 when measured at a multiplication of 100^n with a photosensitive film thickness of 5 to 30 μm would be totally unexpected.

8. I declare under penalty of perjury that the foregoing is true and correct, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed by,

Date: November 19, 2002

Signature: Chikara Ishikawa

Name: Chikara ISHIKAWA

Title:

CHIKARA ISHIKAWA
1325 Akahama,
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(Japanese Citizen)

March 1993
Graduated from a master course of Faculty of Engineering, Yamagata University

April 1993
Began employment with Hitachi Chemical Company, Ltd. And has been engaged in said company since that time in the study and development of photosensitive films.

Inventor of U.S. Patent Application Serial No. 09/508,771 and is well aware of the prosecution history thereof.